REMARKS

Claims 1, 2 and 7-59 are pending and stand rejected. Claim 22 is hereby cancelled. Claims 1 and 34 are hereby amended. No new matter is added by the amendments presented herein.

The Examiner has rejected claims 1-59 under 35 U.S.C. §112, second paragraph, for indefiniteness, as follows:

Claims 1, 9, 10, 34, 43 and 43 are rejected for recitation of the term "low" in reference to a low-moisture, high-fat ingredient. The Examiner asserts that "low" is undefined in the specification and as such cannot fathom the metes and bounds of this term. In response, the paragraph spanning pages 5 and 6 of the specification indicates that the "low moisture, high fat ingredient can be ADM's HFP. The enclosed copy of a page available on www.admani.com indicates that HFP has a moisture content of about 10%, while other suitable substitutes (see, page 4, lines 12-14), soybean and cottonseed, have moisture contents of less than 18% and about 10%, as indicated in the enclosed excerpts from two public websites, www.agprofessional.com and www.cottoninc.com. A person of skill in the art at the time of filing this application would have recognized that the moisture content of these examples of low moisture, high fat ingredients, HFP, soybean and cottonseed, were less than about 18%, and more typically less than about 11%. A person of skill in the art would recognize what is meant by "low moisture" in the context of the present invention.

Claim 22 is rejected for recitation of "unclassified, " which assertedly has no meaning to the Examiner. Claim 22 is hereby cancelled and claim 23 is amended to remove the term "unclassified" and to depend from claim 1.

Claim 39 is rejected for recitation of a "loss-in-weight" feeder. The Examiner asserts that this term has no meaning in the art. In response, "loss-in-weight feeders are well-known in the art. Applicants hereby provide copies of pages of the web-sites www.vibrascrewinc.com, http://www.ktron.com/Products/loss_in_weight.cfm and http://www.thermo.com/com/cda/product/detail/1,1055,1a5998,00.html as evidence thereof.

Claim 9 is rejected because it is said to be unclear to what the "crude fat, crude protein, starch and crude fiber" refer. Crude fat, crude protein, starch and crude fiber are qualities of any foodstuff and the percentages recited would be the results of analysis of the low moisture, high fat ingredient claimed in that claim. Any of the recited examples of low moisture, high fat ingredients comprise some amounts of crude fat, crude protein, starch and crude fiber. A person of skill in the art would recognize this in the context of the claims and the description of the low moisture, high fat ingredients found in the specification. Applicant particularly points out the description of HFP found on page 6 of the specification. A person of average skill in the art, when reading the last sentence of the paragraph spanning pages 5 and 6 of the present application, would not think that one would mix ingredients called "crude fiber," "crude protein," "crude starch" and "crude fiber." That person would readily recognize that those recited percentages reflect analysis of the crude fat, crude protein, starch and crude fiber values for that product. Thus the low moisture, high fat ingredients "contain" or "comprise" the recited amounts of ingredients. Claims 1 and 34 are amended for clarity to recite that the low moisture, high fat ingredient comprises fat, protein and fiber, as do HFP, soybeans and cottonseeds, the exemplary low moisture, high fat ingredients recited in the specification.

The Examiner has rejected claim 59 under 35 U.S.C. §102(b) for anticipation by United States Patent No. 4,431,675 to Schroeder *et al.* ("Schroeder *et al.*"). Specifically, the Examiner asserts that the product claimed in claim 59 appears indistinguishable from the product described in Schroeder *et al.* and has placed the burden on the Applicants to prove that the claimed product differs from that described in Schroeder *et al.* In response, Schroeder *et al.* discloses a feed block that is solidified from a liquid slurry by the admixture of calcium and phosphate, followed by addition of magnesium oxide as an additional hardening agent (see, column 7, line 60 through column 8, line14). Though a metal oxide, such as calcium oxide and/or magnesium oxide, is included in the presently claimed invention, no phosphate is added to cause the hardening indicated in Schroeder *et al.* Thus, the feed block of the presently claimed invention is pressed to facilitate the hardening process. The product of Schroeder *et al.* is decidedly different from that of claim 59 because it contains the reaction product of

calcium and magnesium with phosphate. One such reaction product is calcium phosphate, in one of its various forms ("CaP," which can exist in a multitude of forms, such as amorphous CaP, hydroxyapatite, brushite and tricalcium phosphate). Absent the addition of phosphate to the product claimed in claim 59, there is no substantial formation of, for example, CaP in that product. There also is no reaction product of magnesium oxide with phosphate and/or CaP. Lastly, claims 1 and 34 are hereby amended, as described above, to recite that the low moisture, high fat product has a fat, protein, starch and fiber components, something not present in the products described in Schroeder *et al.* Therefore, there is a substantial difference between the product described in Schroeder *et al.* and that which is claimed in the present application. For this reason, Applicant respectfully requests reconsideration of this rejection.

The Examiner has rejected claims 1, 2 and 7-59 under 35 U.S.C. § 103(a) for obviousness over Schroeder *et al.* in view of United States Patent No. 5,935,626 to Moechnig *et al.* (Moechnig *et al.*) and further in view of United States Patent No. 6,168,803 to Harris *et al.* (Harris *et al.*). As mentioned above, the product and process claimed in claims 1 and 34, and therefore claims dependent therefrom, are entirely different than those of Schroeder *et al.*, which involve use of phosphate and do not contain the equivalent of the low moisture, high fat ingredient. The product of Schroeder *et al.* will harden into a solid block without pressing, which is not necessarily the case without addition of phosphate. Hardening of the presently-claimed product is facilitated by pressing.

As mentioned at the bottom of page 5 of the present specification, acidulated soapstock is replaced with the low moisture, high fat ingredient, thereby increasing the flowability of the un-set product. Moechnig *et al.* describes a system for producing pelleted mineral feeds, and, though there is brief mention that formation of tubs, blocks, pellets and cubes is an object of the invention, there is no teaching of how that is accomplished. The disclosure of Moechnig *et al.* is directed to a multi-layer mineral granule. This disclosure is not analogous to the pressed feeding block claimed in the present application because it applies to a layered pellet structure. Further, as with Schroeder *et al.*, it does not describe use of the low moisture, high fat ingredient.

Lastly, Harris *et al.* provides no additional detail as compared to Schroeder *et al.* and/or Moechnig *et al.*

The Examiner couches the obviousness rejection in terms of the multitude of permutations made possible by the disclosures of Harris *et al.*, Schroeder *et al.* and/or Moechnig *et al.* While these references do disclose a number of permutations of feed block/mineral granule compositions and methods of their preparation, they describe different feed block systems (hardened systems using metal oxides and phosphorous to set the blocks or pelleted systems) and do not disclose, alone or in combination, the feed block claimed in the present application. Further, no cited reference describes the use of a low moisture, high fat ingredient as is claimed in the present application. Because there is no such description, and because the references are non-analogous art to the presently claimed products and processes, and thus no suggestion or motivation to combine the teachings of those references, the Examiner has not made a *prima facie* case for non-obviousness. See, Manual of Patent Examining Procedure ("MPEP," version 8.2) §2143 *et seq*. For these reasons, Applicant respectfully requests reconsideration of the rejection of claims 1, 2 and 7-59 for obviousness over the cited references.

Reconsideration and allowance of the claims are requested. If the undersigned

Alliance Nutrition™ Dairy

MoorMan's Consolidated Nutrition Tindle Feeds.

Archer Daniels Midland

ADM Alliance Nutrition

Alliance Beef
Alliance Dairy
Alliance Deer & Elk
Alliance Dog & Cat
Alliance Equine
Alliance Game Birds
Alliance Goat
Alliance Poultry
Pen Pals Rabbit
Alliance Research
Alliance Swine
Alliance Show Feeds
Alliance Animal Health
Dealer Application
Dealer Locator

MSDS

Consolidated Nutrition
MoorMan's
Tindle Feeds

Products:

HFP (High Fat Product)

Archer Daniels Midland Company is unlocking the potential of nature for dairy producers with HFP (High Fat Product). Maximized milk production, lowered costs, and convenience are three important benefits HFP has over traditional energy sources.

To maximize production in your high-producing dairy cows, the ration must provide the most energy possible without sacrificing rumen health. A healthy rumen means more milk and components. HFP offers a unique profile to complement high energy rations. This results in the maintenance of milk and butterfat production through the summer heat; improvement in the quality of milk produced; or an increase in milk butterfat and milk protein.

On-farm feed trials show lower feed costs for producers who have used HFP to replace other fat sources such as cottonseed, roasted soybeans, or tallow. Lowering input costs is a vital part of remaining profitable in today's marketplace. For example, a dairy milking 6,000 cows, feeding a mixture of HFP, hay, silage, whole cottonseed, canola meal, beet pulp, barley, and hominy can save around $500 per day. So whether you buy HFP direct or have it added to your grain mix at the feed mill, the cost savings are real.

Highly palatable HFP is convenient in ways other fat sources are not. HFP is in meal form, so you can include it in your cows' ration as a high-fat source without special handling procedures-unlike cottonseed or tallow.

HFP is a consistent blend of corn and soybean coproducts from ADM's vegetable oil extraction and

refining processes. Through a unique process, nearly half the lipid content is rendered ruminally inert, resulting in a product that helps get more energy to the cow without depressing fiber digestion. The high-quality vegetable protein is nearly one-half rumen bypass, so it gets more nutrients and intact natural protein directly to the animal. This reduces excess nitrogen in the rumen and ensures that more intact natural protein gets into the small intestine and ultimately to the cow. The combination of nutrient profile and rumen escape values makes HFP a welcome addition to the ingredients used for your high-performance herd.

The fiber component rounds out this unique blend and enables HFP to add a source of degradable fiber to the ration. The added source of energy for rumen microbes is not as rapidly degraded as NSC and helps maintain the pH of the rumen, reducing acidosis.

Usage rates vary, depending on the level of fat, fiber, and protein from other sources, as well as the proper blending of all nutrients to maintain proper rumen function and high animal performance. Additional applications include feedlots, stocker, cow calf, and show stock supplementation.

ADM is committed to least-cost production through efficiency and volume. As the largest soybean and corn processor in the world, we can produce, handle, and transport HFP to the farm, giving you a high quality, consistent, and economically priced feed ingredient-in the amount you need, when you need it. Find out for yourself what so many dairy farmers already know: HFP lowers costs and maximizes production. And that means savings for your dairy.

Utilizing HFP in Feed Formulations

HFP (High Fat Product) is a unique feed ingredient that has utility in many ration formulations. With 18% fat, HFP is able to increase energy content of rations without increasing starch content. The bypass characteristics of the fat enable it to complement rations that are already utilizing high levels of fat without depressing rumen function. Individual feeding schemes and rations will dictate how much HFP can be used but most users report success with 2-4 pounds per head per day in high producing dairy rations. Use in beef grower/feedlot rations will be similar and depend on other energy sources available and fiber level of the ration. Sufficient long fiber inclusion as well as consideration for the total fat in the diet will help to maximize the benefits seen with HFP. The lipid is derived from 100% vegetable sources so no restrictions on use by animal species are needed. By utilizing salts of fatty acids compared to neutral oil (as is found in whole oilseeds), HFP is able to work into balanced formulations without depressing fiber digestion.

The bypass protein found in HFP also distinguishes it from competing energy products in many rations. The protein and soluble fiber characteristics of HFP enable it to blend well with a variety of ingredients which gives you more flexibility in developing rations for high producing animals. HFP has been used successfully in dairy and beef cattle diets, show feeds, horse rations, as well as sheep and goat rations. The guaranteed analysis is as follows:

Crude Protein .....Not less than 16%
Crude Fat .....Not less than 18%
Crude Fiber .....Not more than 20%
ADF.....Not more than 30%
Ash.....Not more than 11%

Typical nutrient profiles including CNCPS values for ration programs are:

ADM High Fat Product Analysis Table

Nutrient	Typical Value As Fed	Typical Value Dry Matter
Moisture, %	10	
Dry Matter, %	90	100
Ash, %.	9	10
Crude Protein, %	17	19
Bypass Protein, %	48	
Crude Fat, %	18	20
Bypass Fat*, %	46	
Starch, %.	4	4.5
Crude Fiber, %	18	20
NDF, %o	38	42
ADF, %	26	29
TDN	83	93
NEL, Mcal/lb	1.0	1.1
NEM, Mcal/lb	1.1	1.2
NEG, Mcal/ lb	0.8	0.9
Ca, %	0.34	0.38
P, %)	0.40	0.45
Mg, %	0.25	0.28
K, %.	0.88	0.99
Na, %	1.25	1.40
S, %	0.13	0.14
Zn, ppm	43	48
Cu, ppm	2	2
Mn, ppm	24	27
Mo, ppm	1.2	1.4

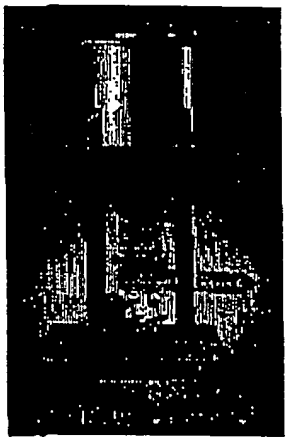
These values are averages and should not be interpreted as guarantees for contractual purposes. No implications or usage recommendations are to be made from the above values. *18-hour in-situ analysis. Ingredients: Processed Grain By-products, Roughage Products, Vegetable Oil Refinery Lipid (feed grade), and Bentonite.

Vibra Screw Inc. **Products**

Weigh Feeders and Batchers

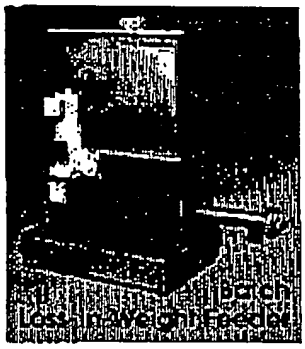
Vibra Screw weighing equipment is designed and engineered to provide the most accurate dry material feeding and batching available in the industry today. Advanced microprocessor controls and a wide range of feeder types allow you to handle most materials at any rate you select, for maximum accuracy and flexibility.

Continuous Loss-In-Weight Feeder



The Vibra Screw Continuous Loss-In-Weight Feeder provides unparalleled versatility in handling a broad range of feeding requirements. Feed rate from 20 pounds to 24,000 pounds per hour can be accomplished with accuracies of plus or minus 1/4-1% on a minute-to-minute basis at 2 sigma. Control of the feeder is through a microprocessor-based controller equipped with one million counts of resolution and exclusive disturbance elimination technology. Feeding devices can include pan or tube feeders, screw feeders and belt feeders.

Batch Loss-In-Weight Feeder



Similar in design to the continuous weigh feeders, Vibra Screw's line of batch feeders are capable of batches from ounces to tons, feeding materials from liquids and fine powders to fibrous or flaky materials. Control of batch size and feed time is provided through a unique control package that eliminates the effects of plant noise and the need for traditional vibration dampening devices. Batch accuracy of 1/4 to 1/2% or better can be achieved.

Gain-In-Weight Batching

This is a cost effective method of weighing since it requires only one or two scale systems for a number of ingredients. Batch sizes can range from grams to several hundred pounds. Sophisticated control packages can weigh up to 64 ingredients with up to 255 stored recipes or formulas.

Control Packages

Controls

Vibra Screw equips its continuous and batch weigh feeders with state-of-the-art controllers. All controllers incorporate user-friendly, menu-driven software. Membrane keypads and easy-to-read displays support a revolutionary concept of deciphering actual weight from

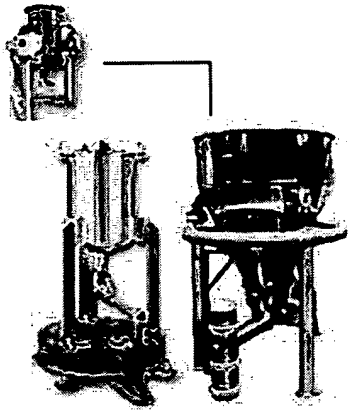
plant vibration and electrical noise.

Complete control packages are available not just to run Vibra Screw equipment but other equipment included in the system. Motor control panels and PLC controllers are available for turnkey operation.

Home Return to Products Page

Vibra Screw, Inc.
755 Union Boulevard, Totowa, NJ 07512 ¤ (973) 256-7410 ¤ Fax (973) 256-7567 ¤ E-mail: info@vibrascrewinc.com

Loss-in-Weight



Application
Use loss-in-weight modular feeders for materials with varying bulk density and for material handling automation. These feeders are the best choice for long term accuracy, repeatability and quality documentation, and where dust control is a concern.

Twin Screw Models
Materials Fed: pigments, sticky, bridging or flooding powders, fiberglass.

Model	Low feed rate		High feed rate	
	dm^3/hr	ft^3/hr	dm^3/hr	ft^3/hr
T-20	0.1	0.004	200	7.0
T-35	1.8	0.063	2500	88
T-60	22	0.78	7200	250
T-80	25	0.88	30600	1070

Single Screw Models
Materials Fed: pellets, free-flowing powders

Model	Low feed rate		High feed rate	
	dm^3/hr	ft^3/hr	dm^3/hr	ft^3/hr
S-60	0.1	0.004	4500	160
S-100	10	0.4	15800	560
S-500	70	2.45	45300	1585

Quick Change Single/Twin Screw Feeders
Specially designed for applications requiring the maximum possible material handling and changeover flexibility.
Materials Fed Single Screw: handle free-flowing materials such as pellets and powders.
Materials Fed Twin Screw: handle more difficult materials such as pigments, sticky, bridging or flooding powders, fiber and fiberglass.

Model	Low feed rate		High feed rate	
	dm^3/hr	ft^3/hr	dm^3/hr	ft^3/hr
S-60	0.1	0.004	4500	160
T-35	1.8	0.063	2500	88

Info Quick Change Single/Twin Screw Info Sheet

Vibratory Models

Materials Fed: free-flowing abrasive or friable materials, fiberglass.

Model	Low feed rate		High feed rate	
	dm^3/hr	ft^3/hr	dm^3/hr	ft^3/hr
KV2	2	0.07	2500	88.3
KV3	25	0.88	8500	300

Bulk Solids Pump (BSP) Loss-in-Weight Models
Materials Fed: free-flowing pellets and granules.

Model	Low feed rate		High feed rate	
	dm^3/hr	ft^3/hr	dm^3/hr	ft^3/hr
BSP-100	2	0.07	200	7
BSP-125	9	0.32	900	32

Liquid Loss-in-weight Models

Liquid loss-in-weight feed rates dependent on tank size, scale size and selected metering device.

Pharmaceutical Feeders
Twin Screw Models
Materials Fed: pigments, sticky, bridging or flooding powders, fiberglass.

Model	Low feed rate		High feed rate	
	dm^3/hr	ft^3/hr	dm^3/hr	ft^3/hr
T-20	0.04	0.001	180	6.4
T-35	1.4	0.05	1840	65

Single Screw Models
Materials Fed: pellets, free-flowing powders.

Model	Low feed rate		High feed rate	
	dm^3/hr	ft^3/hr	dm^3/hr	ft^3/hr
S-20	0.017	0.0006	90	3.2

Control Options
All K-Tron loss-in-weight feeders come with the SmartConnex Feeder Control Environment. Operator interface options include:
KSU single feeder control.
KSL single line control (up to 8 feeders).
KSC multi-line control (up to 30 feeders and up to 8 lines).

Other Options
Shear Hopper for Modular Feeders. The shear hopper reliably prevents bridge-building of cohesive bulk materials. This special hopper can be used with all K2 Modular Feeders in place of the standard 4D hoppers.

Weigh Feeder Accuracy
Weigh feeder accuracy is a measure of how closely a feeder discharges material at the desired flow rate. A complete expression of

accuracy includes measurements of repeatability and linearity. Repeatability measures the extent of discharge variability at a given flow rate. Linearity gauges the deviation of average flow rate over the feeder's full operating range.

Request Literature | Request Quote

K-Tron Soder | Hurricane

K-Tron International, Inc. • Routes 55 and 553 • Pitman, NJ 08071-0888 USA
Phone +1.856.589.0500

ThermoElectron
Toll Free from Canada
1 800 268-4292
Toll Free from USA
1 800 227-8891

Loss In Weight Feeders from Thermo Ramsey

PO Box 10
4-14 Gormley Industrial Ave
Gormley ON L0H 1G0
Tel: 905 888-8808
Fax: 905 888-8828

May 17, 2004

Products by Category:

PROCESS INSTRUMENTATION
CONTROL EQUIPMENT
Continuous Level
Point Level
Ultrasonic Flow
Weight
PHYSICAL MEASUREMENT
Loss In Weight Feeders
Pro Line Motion Monitoring
Pro Line Under Speed
Volumetric Feeders
FLOW
MICROWAVE
Granuflow DTR 131
Granuflow GTR 130
LEVEL
ULTRASONIC
SonaMaster
SonaTech
CAPACITANCE
Cap Series
RT Series
ELECTRO MECHANICAL
C Level
Inventory Mgmnt Software
BOB Inventory Measmnt.
STRAIN GAUGE
C Level
TILT
Pro Line Tilt
SAFETY SWITCHES
Conveyor Belt Misalignment
THERMO RAMSEY WEB SITE
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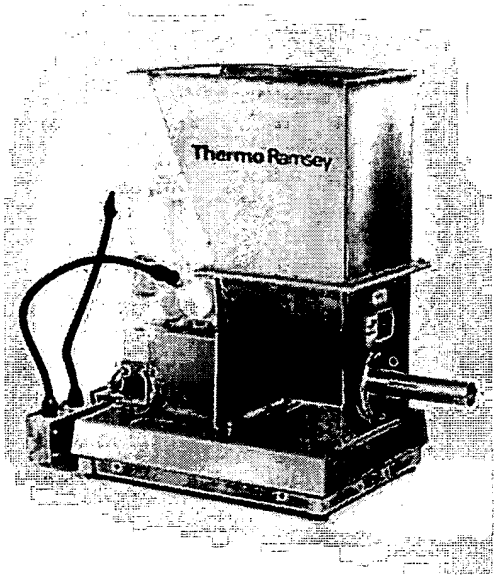
Loss In Weight Feeders from Thermo Ramsey

Thermo Ramsey's Loss-In-Weight Feeders maintain quality, weighing accuracy, reduce material waste and improve blend consistency for ***increased profits.***



The accurate feeding of a dry bulk material is often critical to maintaining product quality. A feeder that weighs accurately and reliably can reduce material waste, improve blend consistency, and increase profits. Thermo Ramsey?s Loss-in-Weight systems accurately control the flow of powders, pellets, flakes or granules to critical processes.

Theory of Operation

The continuous Loss-in-Weight principle involves weighing the entire feeding system (hopper, feeder and bulk materials) by means of a static type scale system and controlling the discharge feed rate of the bulk material, by means of a variable speed motor.

Material is discharged from the system (via screw or vibratory tube or tray) with the measured ?loss in weight? per unit time (dv/dt) compared to the desired (set) feed rate. The difference between the actual (measured) rate and the desired (set) rate produce a corrective action by the feed rate controller (Micro-Tech 2104), which automatically adjusts the feeder speed, thus maintaining accurate feed rates with no process lag.

Advantages of Loss-in-Weight Feeding

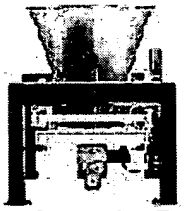
- Handles hot, floodable and difficult materials
- Unaffected by dust and material accumulation
- Well suited for low feed rate applications
- Entire system is weighed. No errors from belt tensioning or tracking.
- No transportation lag time exists, which assures precision second-to-second accuracy.
- Feed accuracy can always be checked during normal operation, without the need for sampling.

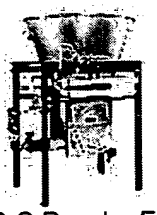
ThermoElectron
Toll Free from Canada
1 800 268-4292
Toll Free from USA
1 800 227-8891

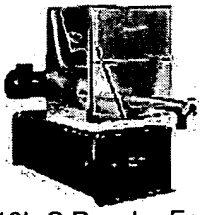
Loss In Weight Feeders from Thermo Ramsey

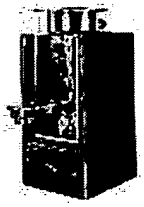
PO Box 10
4-14 Gormley Industrial Ave
Gormley ON L0H 1G0
Tel: 905 888-8808
Fax: 905 888-8828

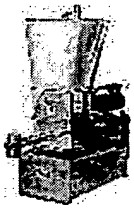
Loss in Weight Feeders

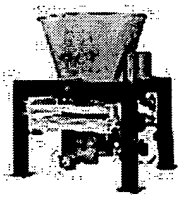

PF-LC-S Powder Feeder

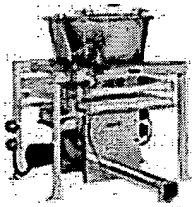

PF-SC-S Powder Feeder

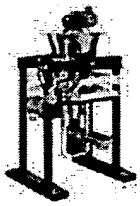

PF-18L-S Powder Feeder

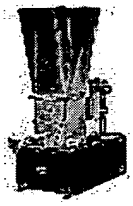

PF-8-V Spiralator Powder Feeder


PFM-18L-S Powder Feeder

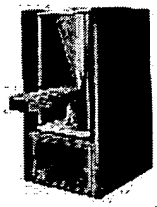

LWF-LC-S Screw Feeder

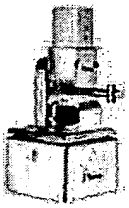

LWF-SC-S Screw Feeder

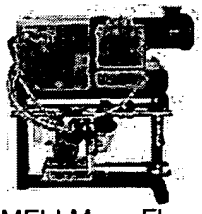

LWF-SC-V Vibratory Feeder with Spiralator

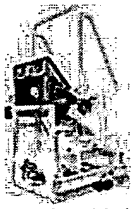

LWF-18L-S Screw Feeder


LWF-18L-V Vibratory Feeder with Spiralator

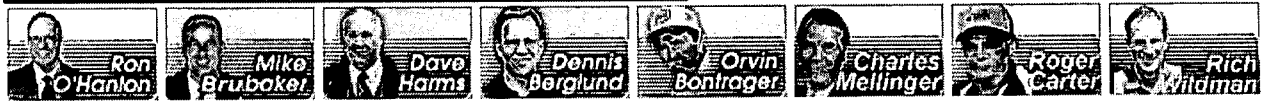

LWF-8-V Vibratory Feeder


LWF-8-LRF Screw Feeder


MFLI Mass Flow Liquid Injection System


Portable Bin Unloader

Return to Thayer Home.



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Consider Moisture in Soybean Harvest

Ron O'Hanlon, CPCC-I
September 12, 2001

Awareness of grain moisture content is more important for soybeans than for most other row crops harvested on the High Plains.

Since soybeans are sold by weight, producers will sustain a loss of potential income when selling soybeans below 13% moisture. When soybeans are at full maturity - where 95% of the pods have reached their mature pod color - it may only take 5 to 10 good drying days before the beans are ready for harvest.

When soybeans are ready for harvest, they may dry very quickly. It is not unusual to see grain moisture drop several percentage points during the day as the beans are being

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Crop Talk This Week

Water and Worms
6-17-2004
Dave Harms, CPCC-I, CCA
In the Midwest, we have had an excess of two things in the last two weeks - water and worms. more>>

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Questions to ask yourself right now more>>

Misapplication Damage
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Ron O'Hanlon, CPCC-I
Accidents can happen! Therefore, it takes planning and preparation to prevent accidents as much as possible. Accident can be costly when it comes to crops.

harvested.

Soybean harvest can start any time the moisture content is below 18%, but most farmers prefer to harvest below 16% moisture. It is common to begin harvesting while some leaves are still attached and there is still some green color in the stems.

Delaying harvest greatly increases shatter losses as the moisture content decreases. Loss from shattering can easily exceed 10% or more, when the moisture content drops below 13%.

The elevator price dockage for soybeans at 14% moisture is usually less than it would be for selling soybeans at 12% and with accompanying shatter loss. A 10% shatter loss from a field yielding a potential 50 bushels per acre would result in about $25 per acre loss just from shattering, if using the loan rate for soybeans.

Table 1, from the University of Nebraska Cooperative Extension *Crop Watch* newsletter, shows the potential income loss from selling soybeans at less than 13% grain moisture.

Potential loss from selling lower moisture soybeans						
Price, $/bu	Market loss, $/A Moisture content, percent					
	13.0	**12.0**	**11.0**	**10.0**	**9.0**	**8.0**
4.50	0.00	2.56	5.06	7.50	9.89	12.23
5.00	0.00	2.84	5.62	8.33	10.99	13.59
5.50	0.00	3.13	6.18	9.17	12.09	14.95
6.00	0.00	3.41	6.74	10.00	13.19	16.30
6.50	0.00	3.69	7.30	10.83	14.29	17.66
Equivalent bu/A because of reduced moisture						
	50.0	49.4	48.9	48.3	47.8	47.3

more>>

Recreational Cultivation

6-11-2004
Orvin Bontrager
In Nebraska in the traditional ridge-till areas, a cultivation followed by a hilling or ridging operation has been standard on row crop corn and soybean production. more>>

Soil Testing

6-10-2004
Dave Harms, CPCC-I, CCA
A good soil test is an investment that reduces costs and increases income. more>>

How Do Uneven Corn Stands Affect Yield?

6-10-2004
Dennis Berglund, CPCC-I
Some fields in our area have had variable moisture and cool soil temps, which resulted in uneven corn emergence. more>>

Hessian Fly Damages Wheat

6-7-2004
Ron O'Hanlon, CPCC-I
Hessian fly is one of the most damaging insect pests to wheat in the United States, but there is a tendency of only finding sporadic severe infestations across the High Plains area. more>>

Storm Damage

6-4-2004
Orvin Bontrager, CCA, CPAg
Much of the west has received various storm events in the past 14 days. more>>

Rain Makes Nitrogen Loss

6-3-2004
Dave Harms, CPCC-I, CCA
The old saying at the board is rain makes grain. It also floods fields and causes nitrogen losses. more>>

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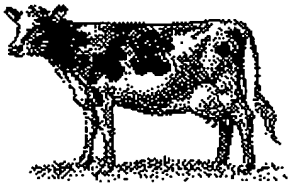
Whole Cottonseed: A Super Feed for Dairy Cows



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Introduction

When seed cotton is ginned, more seed than fiber is produced. For each 480-pound bale of lint, an average of about 780 pounds of cottonseed are produced. Depending on the size of the cotton crop, approximately 5.5 millions tons of cottonseed are produced annually. Texas is the state of largest cotton production followed by California, Mississippi, Louisiana and Arkansas.

Whole cottonseed (WCS) is indeed a very special feedstuff. It has become recognized by dairymen as the premier feedstuff for lactating cows of high genetic merit. WCS has energy, protein, fiber and phosphorus concentrations greater than many other available ingredients. This characteristic makes it ideal for mixing with other, less nutrient-dense, feeds to produce a balanced ration. A comparison of the nutrient profile of WCS with other commonly available protein supplements shows it to be the only one with both high energy and high fiber. This feature is especially attractive to the high producing cow in negative energy balance who is usually starved for both energy and fiber. Its fat content makes it especially valuable for cows under heat stress.

Inclusion of WCS in the diet of the early-lactation cow usually increases the energy eaten while often increasing milk yields. It frequently has a positive effect on milk fat test though a negative effect on milk protein. On balance, the effect on milk price is usually positive. Most computer programs underestimate the true value of WCS because they fail to account for its positive influence on milk production.

WCS does not need to be processed before feeding and it should be mixed with other components of the diet, ideally in a total mixed ration (TMR). The feeding range of 5 to 8 lb per cow per day is usually safe. Careful calculations of free gossypol intakes based on seed analyses should be done if greater amounts are fed, especially for extended periods.

Value and Pricing

The dollar value of any feed ingredient should reflect the nutrients it contains relative to the cost of nutrients in other available feedstuffs. The most comprehensive way to do this is with a computer that solves simultaneous equations given an array of available feedstuffs and their costs. However, these programs have limitations, especially in the case of a special ingredients, such as WCS, which supplies energy in the form of fat, plus protein and a digestible fiber. In addition, the use of WCS will often increase milk fat test, although a small depression in milk protein often occurs. However, the net effect on milk price has usually been positive. Therefore, the value of WCS is often $20 to $40 more per ton than a least-cost computer formulation that ignores milk revenues may show. A simple approximation can be obtained by using prices of: 1) corn to represent the value of energy; 2) soybean meal (44%) to represent the value of protein; and 3) a good coastal bermuda grass hay (CBH) to represent the value of fiber. To arrive at an approximation of the value for WCS, use this formula: price of corn times .90, plus the price of soybean meal (44%) times .25, plus the price of CBH times .50. As a specific example: ($100/ton x .90) + ($180/ton x .25) + ($70/ton x .50) = $170. This value incorporates the contribution of fiber as well as energy and protein, which is crucial to the cow in the first trimester of lactation. During the last half of lactation, fiber is usually not a constraint, and the value of fiber in the formula should be discounted by at least half.

The Value of Whole Cottonseed in Key U.S. Dairy States, Plus Selected Southern Locations

January 1993*

Location	Hay Price $/Ton*1	Soybean Meal Price $/Ton*2	Corn Price $/bu	Tallow Price $/lb*3	WCS Price $Ton	Value of WCS $/Ton*4		
						High Prod.	Med-Low Prod.[1]	Med-Low Prod.[2]
Cent.California	115	226	3.12	.165	174	180.79	170.86	160.15
So. Minnesota	110	217	2.22	.160	175	191.06	151.58	134.8
W. New York	110	205	2.55	.175	171	187.45	156.84	136.28
Washington	100	249	3.67	.18	192	163.41	162.91	183.89
So. Wisconsin	120	191	2.25	.160	176	197.21	163.08	127.95
N. Florida	80	221	2.92	.180	140	177.56	154.02	152.40
South Carolina	80	225	2.71	.180	140	182.35	150.53	146.73
E. Texas	105	200	2.90	.170	158	174.40	156.83	150.97

- * Reference: Lloyd, Max, 1992. Determining the Value of Whole Cottonseed Fed to Cattle. Cotton Incorporated Project No. 92-753. Clemson, South Carolina.
- *1 Coastal Bermuda, early vegetative, for Florida and South Carolina. Alfalfa, early bloom, premium-quality for all others.
- *2 44% SBM for Mn., Tx., and Wisconsin. 48% SBM for all others.
- *3 Tallow prices are from selected wholesalers and feed dealers. Other feed prices are from the Dairy Profit Weekly newsletter, DPW Publishing Co., St. Paul, Minnesota.
- *4 Crude protein, energy (NeL), and acid detergent fiber were balanced within the dry-matter intake limits of high producing cows. The same nutrients were balanced for med-low producers [1], to include the value of fiber; but without dry-matter-intake as a limiting factor. Rations were balanced for low producers [2] on crude protein and NeL only -- for a relatively inexpensive forage situation.

Table 1.

SAMPLE RATIONS

CENTRAL CALIFORNIA

Whole cottonseed is well positioned in the California market and is priced favorably to other feedstuffs. Of all the feeds offered in the sample rations, whole cottonseed is one of only two

feeds that remain in at maximum usage across all three production strings.

Even when cottonseed is used at maximum levels, the price can increase significantly before it is reduced in the ration, given the April 13, 1993 cost of competing ingredients. For example, cottonseed prices would have to rise $3 per ton while prices for other feed remained constant before the amount of cottonseed is reduced in the high-production ration. For low-producing cows, the price for cottonseed would need to jump $14 per ton to reduce the level fed. The amount of all other feeds, except citrus pulp, declines as milk production falls.

California Sample Rations

Vitamin/Mineral Mix	100 lbs./Milk	80 lbs./Milk	60 lbs./Milk
23% CP Haylage	33.0 lbs.	23.6 lbs.	24.0 lbs.
1:1 Barley/Corn Mix	15.0 lbs.	11.8 lbs.	9.7 lbs.
Dried Citrus Pulp	10.0 lbs.	10.0 lbs.	10.0 lbs.
Cottonseed	8.0 lbs.	8.0 lbs.	8.0 lbs.
48% Soybean Meal	7.6 lbs.	6.3 lbs.	3.5 lbs.

Table 2.
Milk Price: $11.80
Feed prices: April 13, 1993, Turlock, California

WESTERN WASHINGTON
Wedged between the Pacific Ocean and the Cascade Mountains, western Washington producers generally pay more for feed while receiving lower milk prices. Yet they manage to keep their production levels higher than most other parts of the country. They also take advantage of Canadian feeds and ship in cottonseed from as far away as Arkansas.
Whole cottonseed used in conjunction with home-grown feeds or purchased feeds helps Pacific Northwesterners keep their rolling herd averages well above the national average. Cottonseed, because of its high nutrient density, becomes a more economical feed to ship in than some of the other dairy staples.

Washington Sample Rations

Vitamin/Mineral Mix	100 lbs./Milk	100 lbs./Milk
Corn Silage	23.3 lbs.	0.0 lbs.
23% CP Alfalfa	15.8 lbs.	26.3 lbs.
1:1 Barley/Corn	14.2 lbs.	15.0 lbs.
Wheat Midds	10.9 lbs.	15.0 lbs.
Whole Cottonseed	6.5 lbs.	8.0 lbs.
48% Soybean Meal	3.9 lbs.	0.0 lbs.

Table 3.
Milk Price: $12.30
Feed prices: April 13, 1993, Lynden, Wash.

SAMPLE RATIONS
WESTERN NEW YORK
Cottonseed proves both cost-effective and nutritionally effective for high-production strings in New York. Balancing for 100 lb of daily milk at maximum dry matter intake levels, gives all energy sources an even chance. Still, cottonseed is the best choice for high-energy rations in New York. Supporting high levels of production can be accomplished using either cottonseed or another high-energy source. But the cottonseed ration proves more economical, with feed costs at only 28.8 percent of milk income, compared with 29.6 percent for a sample ration using a rumen inert fat.

New York Sample Ration

Vitamin/Mineral Mix	100 lbs./Milk
23% CP Haylage	32.0 lbs.
Hominy	15.0 lbs.
Corn Silage	14.5 lbs.
48% Soybean Meal	9.5 lbs.
Cottonseed	8.0 lbs.

Table 4.
Milk Price: $12.50
Feed prices: April 13, 1993, North Java, N.Y.

SOUTHEASTERN WISCONSIN
In the heart of dairyland, where most producers grow a large share of their feed, imported feeds still play a critical role. Whole cottonseed, because of its unique nutrient profile, is cost competitive and nutritionally effective for high-producing cows. At lower-production levels, cottonseed has a more difficult time competing with on-farm feeds.

In the Wisconsin sample rations, the cost of the cottonseed ration for high-producing cows drops to only 25.2 percent of milk income, compared with 27.1 percent for the ration supporting only 75 lbs. of daily milk.

Wisconsin Sample Rations

Vitamin/Mineral Mix	100 lbs./Milk	75 lbs./Milk
Haylage	35.5 lbs.	12.3 lbs.
Corn silage	32.3 lbs.	57.0 lbs.
Rolled Corn	14.5 lbs.	7.3 lbs.
44% Soybean Meal	10.5 lbs.	11.0 lbs.
Whole Cottonseed	3.3 lbs.	0.0 lbs.

Table 5.
Milk Price: $12.50
Feed prices: April 13, 1993, Johnson Creek, Wis.

SAMPLE RATIONS
CENTRAL FLORIDA
Dairying in Florida, a forage deficit state, can be a real challenge. High feed costs, especially for premium-quality alfalfa, and hot humid summers, cut into profits. Despite those hardships, Floridians have two advantages: lower whole cottonseed prices and higher milk prices.

Even for lower-producing strings in the heat of summer when feed intakes are low, cottonseed in Florida is a good low-cost ingredient because it provides an array of nutrients, such as fiber, energy, and protein. Cottonseed meal is also priced right in the South, however, special attention should be paid to gossypol levels when cottonseed is fed in conjunction with cottonseed meal or cottonseed hulls (see **Cottonseed Feeding Limitations**).

Florida Sample Ration

Vitamin/Mineral Mix	75 lbs./Milk
Hominy	15.0 lbs.
Citrus Pulp	10.0 lbs.
Cottonseed	8.0 lbs.

Bermuda Grass	7.0 lbs.
48% Soybean Meal	3.8 lbs.
Cottonseed Meal	1.4 lbs.

Table 6.
Milk Price: $15.50
Feed prices: April 13, 1993, Okeechobee, Fla.

Sample Rations developed by

- Dairy Profit Weekly
  DPW Publishing Co.
  Trilogic Systems, St. Paul, Minnesota

WHOLE COTTONSEED: ANALYTICAL VALUES

	Book Values*1	Book Values*2	Delinted*2
International Reference Number		5-01-614	5-01-
Dry Matter (%)	92	92	90
	100% Dry Matter Basis		
Ash (%)	4.8	4.8	4.5
Crude Fiber (%)	24.0	24.0	17.2
NDF (%)		44	37
ADF (%)	34	34	26
Cellulose		24	12
Lignin		10	14
Ether Extract-fat (%)	20.0	20.0	23.8
Crude Protein (%)	23.0	23.0	25.0
TDN - Ruminant (%)	96	96	96
DE (Mcal/lb)		1.92	1.92
ME (Mcal/lb)		1.74	1.74
NEL (Mcal/lb)	1.01	1.01	1.01
NEM (Mcal/lb)	1.10	1.10	1.10
NEg (Mcal/lb)	0.77	0.77	0.77
Calcium (%)	0.21	0.21	0.12
Phosphorous (%)	0.64	0.64	0.54
Sodium (%)		0.01	0.01
Magnesium (%)	0.46	0.46	0.41
Potassium (%)	1.00	1.00	1.18
Sulfur (%)		0.26	
Copper (ppm)		9	11
Iron (ppm)		151	108
Manganese (ppm)		19	14
Zinc (ppm)		33	36

- *1 Feedstuffs Reference Issue. 1992. Feedstuffs Vol. 64 No. 29. The Miller Publishing Co., Minnetonka, Minnesota.
- *2 Nutrient Requirements of Dairy Cattle. 1989. Sixth Revised Edition, National Academy Press, Washington, D.C.

Table 7.

MERCHANDISING AND DISTRIBUTION

Since the movement of large quantities of WCS into the feed trade is a relatively recent phenomenon, its distribution channel is in a state of evolution. During the early 1980's, large cotton production in the West resulted in large quantities of WCS moving into the feed trade. This created competition for the cottonseed oil mills' raw material. Less than half the number of oil mills operating just a decade ago are in existence today. The older, inefficient mills have closed and others have become WCS merchandisers. The remaining mills are large, highly efficient and vertically integrated operations that focus on value-added products and customer service.

In very general terms, about 60% of the WCS produced each year is processed into the products, oil, meal, hulls and linters. Of the approximately 40% of the crop sold for feed, about half is handled by cottonseed oil mills or former oil mills. The other half enters the feed trade directly from cotton gins. The distribution channel includes commodity dealers, brokers, feed dealers, truckers and others. In the West, where most of the WCS supply enters the feed trade, a couple of former crushing cooperatives have become efficient and reliable merchandisers of WCS. It stands to reason that merchandisers of WCS who have a crushing background would be proficient at storing, handling, and maintaining the quality of WCS.

During the past few years there have been some wild swings in the WCS market. This was largely the result of inadequate storage capacity, particularly in the South East. Several years ago a similar situation was observed in the West. A large crop produced excess seed and low prices at harvest. The following year, storage capacity was increased. Excess storage capacity has, over time, tended to stabilize the market. Likewise, as more storage capacity is put in place in other parts of the country, the result will be a more stable market beltwide.

The forces of supply and demand determine the price of WCS -- willing buyers and sellers establish the market price for WCS relative to available supplies. Occasionally speculators take large positions that may tend to influence the market, but this is also true of all other commodities since position taking is indeed a major component of supply and demand.
Purchasers of feed grade cottonseed are well advised to deal only with reputable suppliers. Those who are established in the business of storing and handling cottonseed are more likely to provide high quality seed that is traded under established Trading Rules. WCS should not be stockpiled for extended periods unless one is thoroughly familiar with proper storage conditions (See Cottonseed Storage and Handling, Page 9). If one wishes to have a guaranteed supply of WCS for several months or a year, then a more logical approach would be to forward contact for future delivery. This places the responsibility of proper storage on the supplier.

COTTONSEED FEEDING LIMITATIONS

When WCS is a particularly good buy, a reasonable question is: how much can one feed?

Most dairymen in the South and West feed from 5 to 8 lb per cow per day. As a percentage of the total diet dry matter in a TMR, this is about 15%. But this doesn't really tell one how much could be fed for extended periods, say more than 6 months. The concern about the safety of high levels stems from the presence of a compound called gossypol. Research conducted at Auburn University suggests that 24 grams of free gossypol is the approximate upper limit for the lactating cow. This would allow the feeding of up to 10 lb per cow per day if the free gossypol is 0.50% or less in the whole seed. When feeding more than 8 lb per cow per day, one should have an analysis for gossypol run in order to determine the exact amount of free gossypol being fed. The analyses are usually expressed as a percentage of the kernel (meal plus oil); to convert the percentage of gossypol in the kernel to the percentage present in the whole seed, multiply by .68. For example; if a kernel contains 0.92% gossypol, the equivalent amount in the whole seed would be 0.63%. If cottonseed meal and/or cottonseed hulls are also being fed, their contribution to the total free gossypol intake needs to be included also, even though they have much less free gossypol than WCS.

Problems have also been encountered with aflatoxin production by molds in cottonseed. Molds may develop either in the field or in storage. Purchasing agreements should state clearly that the WCS should have less than some specific amount of aflatoxin (20 ppb is the legal limit for feed used in dairy rations). Then the seed should be stored on a well-drained pad protected from rain.

COTTONSEED STORAGE AND HANDLING

Characteristics of Cottonseed

The bulk density of gin-run cottonseed averages about 25 lb/ft3. Cottonseed is hygroscopic and therefore absorbs moisture from, or gives up moisture to, the surrounding air. Storage temperatures below 60°F and 10% moisture content wet basis (mc w.b.) provide best storage conditions. Over many months of storage, cottonseed will retain its greatest value under conditions where it is covered and air is drawn through the pile to reduce and control the temperature and moisture level.

Whole, fuzzy cottonseed has some unique characteristics which make it difficult to handle with common grain handling facilities. Unlike grain, cottonseed has a variable angle of repose. The angle of repose when an unrestricted pile of cottonseed is formed is about 45°. However, after the seeds have settled, they will bridge -- an indication that the angle of repose is greater than 90°. This can create a hazardous situation. Extreme caution must be exercised when handling large volumes of cottonseed to ensure that hazardous situations do not jeopardize worker safety.

Basic Properties of Cottonseed and Cottonseed Products

Product	Bulk Density (lb/ft3)	Volume (ft3/ton)	Weight (lb/bu)	Count (seed/lb)
Whole Seed Loose	20 (18-25)*1	100	32	1,800-2,400
<24 ft deep	25	80		
24-50 ft deep	27	75		
>50 ft deep	30	70		
Mach. Delinted	35 (25-35)*1	57	44	2,400-3,200
Acid Delinted	34-37	54	42-46	4,800-5,600
Meal (extracted)	38 (37-40)*1	53		
Hulls	12(1)	167		
Oil	57	35		
*1 Source: 1992 Feedstuffs Reference Issue. Vol. 64 No. 29.				

Table 8.

TRADING RULES FOR FEED GRADE COTTONSEED

(1) National Cottonseed Products Association (NCPA)

The NCPA is a national trade organization that represents cottonseed crushers, WCS merchandisers, dealers, brokers, chemists, and other allied interests.

Chapter XIII Article 2. Grade and Quality
Rule F-4: Prime Feed Grade Cottonseed.

Prime Feed Grade Cottonseed shall meet the following criteria: Foreign substances shall not exceed 2 percent. Moisture shall not exceed 13 percent. Free fatty acids in the oil shall not exceed 3 percent. Crude protein and crude fat (dry matter basis) will be at least 34 percent when the separate totals for each are combined.

Cottonseed of the Pima variety or other varieties of long staple cotton containing 3 percent or less residual lint on seed after ginning, or admixtures containing such seed must be identified as such at the time of sale.

Rule F-5: Delinted Prime Feed Grade Cottonseed.

Delinted prime feed grade cottonseed shall be mechanically delinted. Lint on seed shall not exceed 5 percent. Foreign substances shall not exceed 1 percent. Moisture shall not exceed 13 percent. Free fatty acids in oil shall not exceed 3 percent. Crude protein and crude fat (dry matter basis) will be at least 37-1/2 percent when the separate totals for each are combined.

Rule F-6: Feed Grade Cottonseed, Off Quality.

Feed Grade Cottonseed, off quality, are those that do not meet the specifications of Rule F-4.

(2) American Cottonseed Association (ACA)

The ACA is a national trade organization that primarily represents WCS interests such as suppliers, brokers and dealers.

SECTION 11 – COTTONSEED STANDARDS
Rule 52 – Grade

A. COTTONSEED
1. Premium Cottonseed shall be sound, not musty, and free of offensive odors. Foreign matter shall not exceed one (1) percent. Moisture shall not exceed eleven (11%) percent. Free fatty acids in the oil shall not exceed three (3%) percent. Crude protein and crude fat will be at least thirty-eight (38%) on a dry matter basis when the separate totals for each are combined.
2. Prime Feed Grade Cottonseed shall be sound, not musty, and free from offensive odor. Foreign substances shall not exceed two (2%) percent. Moisture shall not exceed thirteen (13%) percent. Free fatty acids in the oil shall not exceed three (3%) percent. Crude protein and crude fat (dry matter basis) will be at least thirty-four (34%) percent when the separate totals for each are combined.
3. Gin Run Cottonseed shall be sound, not musty and free of offensive odors.

B. DELINTED COTTONSEED
1. Premium Delinted Cottonseed shall be sound, not musty, and free from offensive odors. Foreign matter shall not exceed one (1%) percent. Moisture shall not exceed eleven (11%) percent. Crude protein and crude fat shall be at least thirty-nine (39%) percent on a dry matter basis when the separate totals of each are combined. Retained lint shall not exceed five (5%) percent.
2. Prime Delinted Feed Grade Cottonseed shall be sound, not musty, and free from offensive odor. Lint on seed shall not exceed five (5%) percent. Foreign matter shall not exceed three (3%) percent. Crude protein and crude fat (dry matter basis) will be at least thirty-seven and one-half (37-1/2%) percent when the separate totals for each are combined.
3. Gin Run Delinted Cottonseed shall be sound, not musty, and free of offensive odors.

C. PIMA COTTONSEED
1. Premium Pima Cottonseed shall be sound, not musty, and free of offensive odors. Foreign matter shall not exceed one (1%) percent. Moisture shall not exceed eleven (11%) percent. Free fatty acids in the oil shall not exceed three (3%) percent. Crude protein and crude fat will be at least thirty-nine (39%) percent on a (dry matter basis) when the separate totals for each are combined.
2. Prime Feed Grade Pima Cottonseed shall be sound, not musty, and free from offensive odors. Foreign matter shall not exceed four (4%) percent. Moisture shall not exceed thirteen (13%) percent. Free fatty acids in the oil shall not exceed three (3%) percent. Crude protein and crude fat will be at least thirty-seven and one-half (37-1/2%) percent on a (dry matter basis) when the separate totals for each are combined.
3. Gin Run Pima Cottonseed shall be sound, not musty, and free of offensive odors.

D. OFF QUALITY COTTONSEED
1. Off Quality Cottonseed shall be such cottonseed not meeting the standards as set froth in A, B and C of Rule 52.

NOTE: When cottonseed is traded under any of the above rules, the sales contract should indicate the organization and the specific grade designation.

Terms and Definitions

Whole Cottonseed (WCS) -- This term refers to fuzzy seed from upland varieties of cotton.

Pima Cottonseed -- This is the seed from pima varieties of cotton, also known as extra long staple (ELS) cotton. It represents a small percentage (about 2%) of US cotton. Pima seed is genetically devoid of linters, the fuzz that covers the seed of upland varieties. Some nutritionists recommend that Pima seed be cracked prior to feeding.

Delinted Cottonseed -- There are two processes used for delinting cottonseed, mechanical and acid. Mechanically delinted is the most common form of delinted seed available in the feed trade. Mechanically delinted seed retains about 1-2% residual linters which usually appear on the ends of the seeds. Acid delinting is a process that completely removes all linters. This process is used for the production of planting seed. At certain times during the year, quantities of culled, or leftover planting seed, become available to the feed trade. Beware of such planting seed unless one can demonstrate that it does not contain chemical seed treatments.

Tables Index

This is a list of all the tables in this report. Click on the text to jump to that table.

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Cottonseed Digest
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